RUSSIAN CATALOGUE

OF

MINISTRY OF WAR.

ENGINEERING

AND

ARTILLERY DEPARTMENTS.

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CATALOGUE.

Engineering Department.

1. *Entrenchment Tools,* used by the Engineer corps. One *steel spade;* two kinds of *axes;* one *point-pick;* one *pick* and one *pick-axe.* The spade and axes are exhibited by the Main Department of Engineers; the others by the Fortress at Dunaburg. Prices: Spade, $1.25; small axe, $1.00; large axe, $1.33; point-pick, $1.15; pick, $1.15; and pick-axe, $2.45.

2. *Tool slings* and drawing, showing their application, exhibited by the Main Department of Engineers. Prices: sling for spade and axe, 85c.; sling for point-pick and pick, 63c.

3. *Model of a Pontoon Bridge:* scale one sixteenth; built for illustration to students of the Nicolay Engineering School. Exhibited by the Engineering Arsenal in Dunaburg. Price $1050.

4. *Model of a Pontoon Bridge Train:* four kinds of wagons for transportation of pontoon bridge, as used by the Russian army at present. Scale one-eighth. Exhibited by the Engineering Arsenal in Dunaburg. Price, $1400.*

5. *Model of a Target-shield,* as used at the Constantine sea shore battery, in fortress Cronstadt. Exhibited by the model shop of the Main Department of Engineers; model made by Mr. Wilde, in St. Petersburg. Price, $1260.

6. *A relief Map of Sevastopol,* showing the siege and defence operations of 1854 and 1855; designed by the late Mr. Masochin, Captain of Engineers; executed at the sculpture works of Mr. Schendhelm, successor to Mr. Heiser, in St. Petersburg. Price of such models, from $17.50 to $24.50, according to their finish.

7. *Specimen drawings: a.* Details of structures; *b.* Barracks buildings; *c.* Construction of fortifications, published for use of the Main

(*) The Engineering Arsenal in Dunaburg has been established for the manufacture of articles nsed for the equipment of engineer corps; the shops are run by two engines of forty-six horse-power; there are in use four steam hammers, twenty-eight blacksmiths' fires; one and two fans. One hundred workmen are employed; the yearly production is eight thousand entrenchment tools and one hundred and forty wagons.

Department of Engineers. Exhibited by the Drawing Bureau. Price, (*a*) $7.00 per copy; the other not for sale.

8. *Standard drawings of Barracks: a.* Barracks for infantry regiments, *b.* Barracks for Cavalry regiments; both published as regulations for designer of barracks in the Department of Engineers, for counties and private capitalists. Exhibited by the Drawing Bureau of the Main Department of Engineers. Not for sale.

9. *Drawings of a Telegraph Train*, showing the construction of wagons for a seventy mile line. Exhibited by the Drawing Bureau. Not for sale.

10. *Description of the Defence of Sevastopol*, in French, by General Totleben. Exhibited by the Main Department of Engineers. Price, for complete edition, $38.50; for condensed, $11.20.

11. *Regulations for laying Pontoon Bridges*, used for instruction in Engineer Corps. Exhibited by Main Department of Engineers. Not for sale.*

(*) The drawing bureau and lithographing establishment of the Main Department of Engineers is composed of officers of the Engineer Department. The work is exhibited by thirty draughtsmen, ten printers, and three bookbinders, under the supervision of six engineers. The model shop of the department makes principally models of fortifications. The work is done under the direction of the drawing bureau. The shop employs fifteen workmen.

Artillery Department.

1. *Imperial Russian Rifle Manufactory at Toola, on the river Oupa.*

(*a*) *Articles exhibited:* Infantry rifles (muskets) used in the Russian army with bayonets, wholesale manufacture, made only by machinery, taken without choosing, for showing the possibility of interchanging the parts.

Requisites of the above named rifles.

(*b*) Section of the rifle made of bracked pieces, in order to show the construction of the mechanism. (Price, 7 roubles, or 5 dollars 25 cents.)

(*c*) Mechanism of infantry rifles, the whole made by machinery, for showing the exactness and perfect work of the machinery without hand labor.

The Toola Gun Manufactory was established in the year 1712, and renewed, the last time, between the years 1870 and 1873. Daily production, during ten hours labor, is 300 rifles, per day. Brackers and workmen, 2,800 men. Worked by water power. Three turbines on Joinwal's system, each of 120 horse power, or 360 total horse power; the height of the fall is 18 feet. In case of low water, the works are carried on by steam power, by means of two engines, the one of 150 horse power, and the other of 50 horse power. They can work with turbines; therefore, the total is 560 horse power—a transmission of 150 horse power to a distance of 100 fathoms by means of a wire cable. Machines, frames and lathes: 1,100. The whole labor is performed by machinery. Total price of a rifle is 24 roubles, or about $18. The barrels and shoes are from Russian factories. The stocks (Nutwood) from the Caucase. Steel for tools, from England. Steel for parts of rifles, from Sweden. Pit coals from neighboring coal mines. Price of rifle barrel, 4 roubles (about $3); shoes, 1 rouble, 80 copecks (about $1.35); bayonet 2 roubles, 50 copecks (about $1.88); stock, 2½ roubles (about $1.88); mean price of labor, 1 rouble (75 cents) per day; highest price 1½ roubles per day. The last renovation of the manufactory amounted to 2,800,000 roubles ($2,100,000.) *The manufactory has received, in the year* 1873, *at the International Exhibition at Vienna, the Verdienst medal.*

2. *Rifle Manufactory at Sestoretsk, near St. Petersburg.*

Cavalry carbine and cossack musket; model adopted in the Russian army. The yearly product is 30,000 rifles. There are 18 brick build-

ings. Workmen, 1,245 men. Founded by Peter the Great in 1714. Price of piece work, of ten working hours, is from 70 copecks (53 cts.) to 4 roubles ($3) per day; usual day labor, from 60 copecks (45 cts.) to 3 roubles ($2.25) per day. Fifteen water wheels and 3 turbines: total power about 330 horse power. The manufactory receives the barrels from abroad, at a price of 2 roubles, 30 copecks ($1.73) each. The stocks, from Italy, at 1 rouble, 20 copecks (90) cts. each.

3. *General Major Baron Hahn, at St. Petersburg.*

Fortress musket of a large calibre, adopted by the Russian army. System of the exhibitor. Composed brass cartridges for this gun; steel and cast iron bullets. Drawing of the musket.

4. *St. Petersburg Artillery Arsenal.*

(*a*) *Mortar, 8-inch calibre,* has stood up to this time 400 shots, of which 300 were with a charge of 17 pounds of prismatical powder, with a pressure of 1,350 atmospheres; and 100 with artillery powder, which gives a pressure of 2,000 atmospheres. *Mortar, 6-inch calibre, 4-pounder field gun* (new model,) cast in a metalic mould, and with pressing the metal in a fluid state by a new system, proposed by the Russian Artillery Colonel *Lavroff.*

(*b*) *3-pounder Mountain Gun,* on an iron carriage, loaded on 4 horses.

(*c*) *Harness* and *collar,* of the system proposed by Colonel *Roubetz.*

(*d*) *Eight-inch, 6-inch shells, and common shell* for 3-pound mountain gun, circumfused with lead.

St. Petersburg Arsenal was founded in 1850. Enlarged 1868–69, under the jurisdiction of the Central Artillery Department. Prepares bronze guns of different calibre, and all requisites belonging to the artillery, iron gun carriages, limbers with boxes, wagon requisites, wagons, jack screws and different lifting apparatus, laboratory and verifying tools, horse harness, circumfuses the shells with lead. Paints, artillery, steam power lathes, machines, steam hammers, and hand work. Large foundry: rolling cylinders, smith shops, fitter shop, mechanic shop, joiner's shop, erecting shop, drawing room, painter's shop, and section for making horse harness. Workmen, about 700 men.

5. *Ordnance Department, St. Petersburg.*

(*a*) Iron carriage for 6-inch mortar. System of General Major *Samenoff.* [*Received in the year* 1873, *at the Vienna Exhibition, a gold Forschritts medal.*]

(*b*) Iron carriage with cork buffer, and with stamped cheeks for a field gun. System of Russian Artillery Colonel *Engelhardt.* This carriage has stood about 700 shots.

6. *Ochta Powder Mills, near St. Petersburg.*

Samples of materials. Saltpetre, purified and unpurified. Sulphur in lumps and purified. Different kinds of charcoal. Imitation of prismatical powder. Drawing of the press for fabrication of prismatical gun powder, proposed by Professor Wisnegradsky. Map of the manufactory. (Particulars as regards the yearly produce of the mills, will be found on the above named map.)

7. *Colonel Winner.*

Samples of gun and musket powder. System of the exhibitor.*

8. *St. Petersburg Cartridge Manufactory.*

(*a*) *Section of Cartridge Case.* Collection of successive parts of the cartridge cases. Complete cartridge.

(*b*) *Cap Section.* Collection of the successive parts of work of the cap.

(*c*) *Section of Fuzees.* Collection of different parts of percussion and distance fuzees.

d) *Tool Section of the Cartridge Manufactory.* Complete collection of gauges for verifying the parts of the Russian dragoon rifle. The simple dragoon rifle made to gauge mentioned above. Complete collection of gauges for the cartridge calibre 4.2. Chamber standard size for cartridge case. Chamber rejecting size, gauge for the length of the case. Plugs, rings, templates for verifying the parts of the case. The standard foot adopted for the manufacture of all tools used in the rifle, small arms, and cartridge manufactures. Dernier calibre, to measure objects 48 inches long. Standard inch adopted for guns, small arms and cartridge works, to be used for measure at 15° Reaumur. Standard size for $\frac{1}{2}$-inch for same. Collection of gauges with plugs for adjustment to measure the diameter of plugs. Collection of 41 plugs standard size, from 0.5″ till 0.520″, each plug differs one from the other 0.0005″. Collection of 41 rings for same. Two taper plugs for diameter of 41, mentioned above rings. The whole set of these gauges made

(*) For special information apply at the Exhibition of the Russian Artillery Exhibition, Machinery Hall, to Capt. Von der Howen, or to Mr. Lookanin, at New York, Broadway, 53.

with correctness to 0.0001″. Collection of gauges for the screw of fuzees used in Russian artillery, the thread 8, 12 and 16 per inch.

All the gauges are made in one precision room (tool section,) for all small arm factories in Russia to have the whole of small arms with complete interchangeable parts.

Details regarding the St. Petersburg Cartridge Works.

THE WORKS ARE COMPOSED OF SIX SECTIONS.

1st. Litainoi Cartridge, case section.
2d. Vasselievskoi Cartridge, case section.
3d. Vasselievskoi Fuzees section.
4th. Vasselievskoi tool section.
5th. Ochta cap section.
6th. Wiborg cartridge charging section.

The Works belong to the Government.

The yearly sum applied for the use of works was in

1872.....	5,231,000	Roubles.
1873.....	3,724,000	"
1874.....	4,603,000	"

including the payment of the administration, remount of buildings and mechanism and new buildings, which in 1872 amounted to 25,400 roubles, and in 1873 to 132,000 roubles.

The Litainoi and Vassilievskoi charging sections were founded in 1869, for preparing metallic cartriges.

Fuzees section was founded in 1873.

Tool Section was founded in 1873, for preparing verifying tools, models and measuring tools for cartridge and gun manufacture.

The Ochta cap works were founded in 1845, with the view of supplying the Army with percussion caps.

In 1870 was instituted the making of percussion caps for the metallic cartridge, to the amount of one hundred and twenty millions per year.

MOVING POWER, &C.

1*st. Litainoi Section*—

6 Boilers:	3 Cornwallis, of	30 h-power each.
	2 Howard's, of	40 "
	1 Howard's, of	20 "
Horizontal Stationary Engines, 4.		
	1 Corliss' system, of	50 "
	2 Meyer's system, of	10 "
	1 Double cylinder, of	20 "
	1 Double cylinder, of	12 "

Shafting, 1,530 *feet.*

2*d. Vassilievskoi Section*—

Boilers 6:	2 Cornwallis system, of	30 h-power each.
	3 Cornwallis system, of	15 "
	1 Boiler with two inner pipes and outside heating furnace of	35 h-power.
Steam Engines 3:	1 Horizontal with condenser, of	35 h-power.
	2 " "	25 " each
Locomotive Boiler:	1 from Marshall's works of	14 "
Steam Pumps,	1	

Shafting, 1,112 *feet.*

3*d. Fuzees Section*—

Boilers:	2 Cornwallis system with one pipe, 20 h-p. ea.
Stationary Engines:	1 Horizontal expansion, without condenser, Meyer's system, 20 h-power.

Shafting, 600 *feet.*

In 1876, will be added

Boilers,	2
Engine,	1

4*th. Tool Section*—

Steam Boilers,	2 Howard's system, of	12 h-power each.
Steam Engines,	2 Horizontal, of	" "
Steam Pump,	1 Casheron's system.	

Shafting, 410 *feet.*

5*th. Charging Section*—

Stationary Engines 4:	1 Horizontal of	20 h-power.
	1 "	10 "
	1 "	25 "
	1 Vertical, with fittings on boiler. All on the expansion system.	
Steam Boilers 7:	2 Horizontal, of	25 h-power each.
	2 "	15 "
	2 Vertical, of	15 "
	1 "	15 "
Locomotive Boiler:	1 Horizontal, of	12 "
Steam pump, for forcing water into the cistern 1,		20 "
	Cistern 1,	
Swing Cranes:	1, for 15 pood weights.	

Shafting, 839 *feet.*

6. Ochta Caps Section.

Stationary Engines 4:	1 Vertical, without condenser, of	15 h-power.
	1 " "	12 "
	1 Horizontal, of	8 "
	1 "	3 "
Steam Boilers 9:	2 Horizontal, with inner pipes and outside furnace, of	20 h-power each.
	2 with heating pipes of	12 "
	1 Vertical, with pipes of	10 h-power.
	1 Ordinary cylindrical, of	8 "
	2 Vertical, with pipes of	10 h-power each.
	1 " "	5 h-power.

Many of these boilers serve for heating the wooden sheds.

Steam Pumps, 3.

Shafting, 675 *feet.*

Working Hands.

1*st. Litainoi Section.*	Assistant Mechanic	1
	Draftsmen	4
	Foremen	5
	Workmen	611
	Boys	233
2*d. Vassilievskoi Section.*	Assistant Mechanic	1
	Draftsmen	4
	Foremen	11
	Workmen	503
	Boys	40
3*d. Fuzees Section.*	Draftsman	1
	Foremen	9
	Workmen	400
4*th Tool Section.*	Draftsmen	8
	Foremen	2
	Brackers	6
	Workmen	198
	Boys	14

5th. Charging Section.	Assistant Mechanic	1
	Foremen	5
	Workmen	442
	Boys	187
6th. Ochta Caps Section.	Assistant foreman	1
	Draftsmen	2
	Foremen	8
	Workmen	452
	Boys	21

At the Vienna Exhibition, in 1873, a medal was awarded to the Cartridge Works.

9. *Mr. N. Wonlarlarsky, at St. Petersbnrg.*

"Groosokat," or Portable Traveling Crane for moving heavy weights, from 10 to 15 cwt., to a voluntary distance.

Received at the St. Petersburg Manufactory Exhibition, in 1870, *honorable mention; and at the Moscow Polytechnic Exhibition,* 1872, *the large silver medal. Patented by Mr. Wonlarlarsky, in the Northern United States of America.* It replaces, quickens, and cheapens the transhipment of goods by hand, at wharves, warehouses, depots, factories and coal mines. One complete sample, made of iron, for the transhipment to a distance of 4 fathoms, costs $300; to 8 fathoms, $600; to 12 fathoms, costs $800. Sample, with wooden cross piece, costs 50 per cent. cheaper. It is brought into use in Russia by the Artillery Department.

10. *Mr. Koorikoff, St. Petersburg.*

Harness for 6 horses, harnessed for Field Artillery. Harness of a new description; breast-piece, breeching, bridles, bridle-reins, traces, saddle, girths, straps and housing. Cossack saddles, housing, saddle-bags, bridle, &c.

Harness for Fireman's trains for 2 horses. Harness, breechings, bridles, traces, &c.

Harnessing for the Intendantship train. Harness, breechings, bridles, braces, straps, &c.

Tawed straps, twined for turning lathes ¼ inch, length 605 feet. Whole reins of tawed leather straps, not sewn, length 22½ feet. Cable of tawed leather 2½ inches in circumference, length 150 feet.

Straps of tawed leather, bread-pit soaked, white, black, &c.

1. In the dependencies of the Factory, there are large workshops not only for making of harness, saddles, army accoutrements

and hospital requisites, but also workshops for joinery and turning, likewise a forge, locksmith workshop, a tallow-melting and glue manufactory.

2. Yearly produce amounts to 1,000,000 Roubles.
3. Means of manufactory by hand labor.
   a. *In the tannery:*
      Pits: ash, bread, tan, &c..... 264
      Boiler for heating water..... 1
      Horse shafting, for pounding the tan with 2 horses 1
   b. *In the tawing section:*
      Pits..... 46
      Horse shafting for kneading leather, single horse... 2
   c. *Wash leather section:*
      Pits..... 8
      Press for pressing..... 1
   d. *Glue Manufactory:*
      Kettles for boiling..... 3
      Boiler for heating of water..... 1

   Driven by means of shafting with two horses:
      (A rolling drum for washing materials)..... 1
      Water pumps..... 2
      Press..... 1
      Pits for ashing of materials..... 18
   e. *In the Harness Manufactory:*
      Glazing Machine..... 1
      Sewing " 8
      Stretching " 1
      Boiler for boiling paints..... 1
      Weavers' looms..... 4
      Carpenters' tables..... 18
      Turning lathes..... 2
      Blacksmith furnaces..... 9
      Brass foundry..... 1
4. Number of workmen employed..... 450
5. The greatest part of the raw materials are procured in Russia, and part from London and Hamburg.
6. The finished goods are disposed of for the most part in Russia, to the War Department; part to manufacturers and traders.
7. Honorable mention of the Russian Manufactory, Exhibition of 1870.

Prize medal at the Vienna International Exhibition of 1873.

Prize medal at the London International Exhibition of 1874.

EXHIBITOR, *Col. Tenner, St. Petersburg.*

Photograph of the lathe for wrapping bullets with paper. System of exponent.

12. *Mr. Gootkovsky, Mechanic, St. Petersburg.*

Photograph of Mechanical scales for verifying cartridges. (System of exponent.)

13. *Mr. Alexandroff, St. Petersburg.*

Photograph of lathe for verifying cartridges in the breech.

14. *Mr. Rentz, Mechanic, St. Petersburg.*

Photograph and drawing of a lathe for mechanically dividing and stamping distance fuzees.